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EXAMINER

PERILLA, JASON M

ART UNIT

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/539,355	Applicant(s) ALI, DANISH	
	Examiner JASON M. PERILLA	Art Unit 2611	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 30 June 2008.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-17 and 20-29 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-17 and 20-29 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 15 June 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. Claims 1-17, and 20-29 are pending in the instant application.

Response to Amendment/Argument

2. The Applicant's remarks, filed May 13, 2009, have been fully considered.

In view of the Applicant's amendments to the claims, an updated rejection is set forth below.

The claims have been amended to recite "assigning to each bit in a symbol, a confidence value determined from constant values which are based on the mapping." Reshef discloses the limitation. The claimed "*constant values* which are based on the mapping" are Reshef's "possible symbol values" (e.g., illustrated in the constellation spaces of figure 4 and 5. They are "constant" because they are the fixed locations in the complex symbol space (figs. 4 and 5) which are associated with particular bit sequences being received. Reshef discloses that "[s]oft symbol values 94 are available at the output of the soft symbol generator 84. Preferably, the soft symbol values are in the form of Log Likelihood Ratio (LLR) values, i.e. LLR(sk). A soft decision, in the ideal case, comprises the reliabilities of each possible symbol value." (emphasis added). Therefore, Reshef's *confidence values* or "soft symbol values 94" are determined from *constant values based on the mapping* or "possible symbol values" which are the fixed locations in the complex symbol space.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. § 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

4. Claims 1-4, 6, 7, 9, 10-13, 15, 16, and 20-22, 26, and 27 are rejected under 35 U.S.C. § 102(e) as being anticipated by Reshef (U.S. Pat. No. 6529559).

Regarding claim 1, Reshef discloses a method of processing a data signal comprising symbols (fig. 4, constellation points) each representing a plurality of data bits (fig. 4, “000”, “001”, etc.), the method comprising: demodulating the data signal to determine the symbols (fig. 2, refs. 52 and 56); mapping each of the symbols to a plurality of bits (fig. 3, ref. 86); assigning (fig. 3, ref. 84) to each bit in a symbol a confidence value (i.e. a log likelihood ratio LLR) determined from constant values which are based on the mapping (fig. 3, ref. 84; col. 10, lines 59-68), and effecting convolutional decoding (fig. 2, ref. 64) of a bit stream associated with the assigned confidence values. Reshef discloses a data signal processor which demodulates (fig. 2, ref. 52) a received signal, equalizes it with a hard decision output (col. 9, lines 15-20 and 55-60), converts the hard decisions from the equalizer into corresponding confidence values or “reliabilities” (fig. 3, ref. 84; col. 10, lines 59-65), and passes the confidence values to a convolutional decoder (fig. 2, ref. 52; col. 3, lines 5-10). Reshef assigns (fig. 3, ref. 86) confidence values (fig. 3, ref. 94) according to a LLR assignment method based upon the constant values of the mapping technique used (i.e., figs. 4 and 5; col. 10, lines 60-68).

Regarding claim 2, Reshef discloses the limitations of claim 1 as applied above. Further, Reshef discloses that the step of assigning a confidence value comprises, in part, mapping symbols to binary bits by means of a Gray code (col. 15, lines 35-53).

Regarding claim 3, Reshef discloses the limitations of claim 1 as applied above. Further, Reshef discloses incorporating data from the step of assigning in a look-up table for reference (col. 16, lines 25-53).

Regarding claim 4, Reshef discloses the limitations of claim 1 according to Reshef's embodiment of figures 2 and 3 as applied above. Reshef does not explicitly disclose, according to his figures 2 and 3 embodiment, re-coding hard decisions as an (I,Q) pair and taking soft decisions therefrom. However, Reshef discloses, in a separate embodiment according to figure 9, re-coding hard decisions as an (I,Q) pair (fig. 9, refs. 156, 158, and 160) and taking soft decisions therefrom (fig. 9, ref. 162). Moreover, Reshef discloses that the method of the embodiment of figure 3 is incorporated in to the method of the embodiment of figure 9 (col. 19, lines 25-40; i.e. within block 162 of figure 9). Therefore, Reshef's embodiment of figure 9, which incorporates all the features of the figure 3 embodiment (i.e. the limitations of claim 1), discloses all the limitations of claim 4.

Regarding claim 6, Reshef discloses the limitations of claim 1 as applied above. Further, Reshef discloses an executable software (fig. 12) embodiment wherein a digital processor (fig. 12, ref. 202) is "operative to execute software adapted to perform the reduced information packet method" of his invention (col. 20, lines 25-50). Therefore, in

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such embodiment, Reshef's equalization (fig. 2, ref. 56) is performed by a digital processor.

Regarding claim 7, Reshef discloses the limitations of claim 1 as applied above. Further, Reshef discloses an executable software (fig. 12) embodiment wherein a digital processor (fig. 12, ref. 202) is "operative to execute software adapted to perform the reduced information packet method" of his invention (col. 20, lines 25-50). Therefore, in such embodiment, Reshef's equalization (fig. 2, ref. 56) is performed by a dedicated signal processing hardware (fig. 12, ref. 202) for equalization.

Regarding claim 9, Reshef discloses a computer program product directly loadable into the internal memory of a digital computer, comprising software code portions for performing the steps of claim 1 (as applied above in claim 1) when said product is run a computer (col. 20, line 25 – col. 21, line 20).

Regarding claim 10, Reshef discloses the limitations of the claim as applied to claim 1 above.

Regarding claim 11, Reshef discloses the limitations of claim 10 as applied above. Further, Reshef discloses the remaining limitations of the claim as applied 2 above.

Regarding claim 12, Reshef discloses the limitations of claim 10 as applied above. Further, Reshef discloses the remaining limitations of the claim as applied 3 above.

Regarding claim 13, Reshef discloses the limitations of claim 10 as applied above. Further, Reshef discloses the remaining limitations of the claim as applied 4 above.

Regarding claim 15, Reshef discloses the limitations of claim 10 as applied above. Further, Reshef discloses the remaining limitations of the claim as applied 6 above.

Regarding claim 16, Reshef discloses the limitations of claim 10 as applied above. Further, Reshef discloses the remaining limitations of the claim as applied 7 above.

Regarding claim 20, Reshef discloses the limitations of claim 1 as applied above. Further, Reshef discloses that the step of assigning a confidence value to each bit in a symbol includes assigning a confidence value based upon the position of the bit in its symbol (see, generally, table 1, col. 16, lines 30-45). According to Reshef's confidence value correspondence table, the confidence value to be assigned is dependent upon bit position (i.e. MSB, SSB, or LSB) for the reference symbol.

Regarding claim 21, Reshef discloses the limitations of claim 10 as applied above. Further, Reshef discloses the remaining limitations of the claim as applied 20 above.

Regarding claim 22, Reshef discloses the limitations of claim 9 as applied above. Further, Reshef discloses that wherein assigning confidence values to bits comprises retrieving confidence values from a look-up table (col. 16; TABLE 1).

Regarding claim 26, Reshef discloses the limitations of the claim as applied to claim 1 above.

Regarding claim 27, Reshef discloses the limitations of claim 26 as applied above. Further, Reshef discloses that the step of assigning a confidence value comprises, in part, mapping symbols to binary bits by means of a Gray code (col. 15, lines 35-53).

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. § 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 5 and 14 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Reshef in view of Ojard et al (U.S. Pat. No. 6826242; "Ojard").

Regarding claim 5, Reshef discloses the limitations of claim 1 as applied above. Reshef discloses the possible use of a decision feedback equalizer or "DFE" (col. 9, lines 55-60) but does not explicitly disclose using a DFE with whitening matched filtering. However, Ojard teaches the benefits of using a DFE with a whitening filter. Ojard teaches that using a whitening filter reduces noise power and partially or fully cancels interfering signals (col. 18, lines 34-55). Therefore, it would have been obvious to one having ordinary skill in the art at the time which the invention was made that the DFE of Reshef could be modified to utilize a whitening filter as suggested by Ojard

because it aides in reducing noise power and partially or fully cancelling interfering signals.

Regarding claim 14, Reshef discloses the limitations of claim 10 as applied above. Further, Reshef in view of Ojard disclose the remaining limitations of the claim as applied 5 above.

7. Claims 8 and 17 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Reshef.

Regarding claim 8, Reshef discloses the limitations of claim 1 as applied above. Further, Reshef discloses de-interleaving (fig. 2, ref. 62; col. 10, lines 20-25), and incremental redundancy steps (col. 3, lines 2-5) before convolutional decoding (fig. 2, ref. 64). Reshef discloses that the encoder (fig. 2, ref. 34) adds "redundancy" bits to the transmitted data (col. 8, lines 40-46). Hence, the decoder, must act upon the redundancy in "incremental redundancy steps" to remove the redundancy (col. 3, lines 2-5). Moreover, in conjunction with Reshef's simulated embodiment of figure 9 (which inherits the features of the embodiment of figures 2 and 3), it is disclosed that 8-PSK bursts are modulated utilizing "punctured rate 1/3 convolutional coding" (col. 19, lines 56-63). Reshef does not explicitly disclose de-puncturing the encoded data among decoding of a transmitted signal (i.e. fig. 9, ref. 162). However, for the utility of the receipt of punctured encoded data, one skilled in the art would find it obvious to de-puncture the received data before decoding it. Therefore, because puncturing is utilized in the coding of Reshef's signals transmitted, it is obvious to one having ordinary skill in the art at the time which the invention was made that Reshef's decoder should utilize

de-puncturing as a compliment to the puncturing encoding to maintain the integrity of the data transmitted.

Regarding claim 17, Reshef discloses the limitations of claim 10 as applied above. Further, Reshef discloses the remaining limitations of the claim as applied to claim 8 above.

8. Claims 23-25 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Reshef in view of Gu (U.S. Pub. No. 2002/0085651).

Regarding claim 23, Reshef discloses the limitations of claim 22 as applied above. Reshef does not disclose that the confidence values further comprise confidence values based on interpolation between values in the look-up table. However, the interpolation of values in a look-up table is illustrated in the art as suggested by Gu (¶ 0044). One skilled in the art is aware that interpolating among values in a look-up table would provide greater granularity among look-up table entries. Therefore, it would have been obvious to one having ordinary skill in the art at the time which the invention was made that the values in the look-up table of Reshef could be interpolated as suggested by Gu to determine intermediate look-up table values because it would permit additional granularity in the embodiment.

Regarding claim 24, Reshef discloses the limitations of claim 1 as applied above. Further, Reshef in view of Gu disclose the remaining limitations of the claim as applied to claim 23 above.

Regarding claim 25, Reshef discloses the limitations of claim 10 as applied above. Further, Reshef in view of Gu disclose the remaining limitations of the claim as applied to claim 25 above.

9. Claims 28 and 29 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Reshef in view of Mills et al (U.S. Pub. No. 2003/0138065; "Mills").

Regarding claim 28, Reshef discloses the limitations of claim 1 as applied above. Further, Reshef discloses that the data signal comprises 8-PSK signals (figs. 4 and 5). Reshef discloses assigning soft or confidence values but does not disclose that the confidence value is determined from a set $[-\alpha, -1, 1, \alpha]$ where α is constant. However, Mills discloses that a common range of soft values is between -1 and 1 (¶ 0038). For the instant application, the use of the set $[-\alpha, -1, 1, \alpha]$ is not disclosed as providing any particular feature or advantage. Further, using any appropriate range of soft values (with accompanying circuitry designed for such range) would produce only predictable results as is understood in the art (i.e., the range $[-\alpha, -1, 1, \alpha]$ provides no synergy). Therefore, it would have been obvious to one having ordinary skill in the art at the time which the invention was made that the use of a range between $[-\alpha, -1, 1, \alpha]$ could be applied in the method of Reshef because any range of soft values could be appropriately used as a matter of design choice.

Regarding claim 29, Reshef discloses the limitations of claim 28 as applied above. Further, the remaining limitations of the claim are considered a matter of design choice as applied to claim 28 above.

Allowable Subject Matter

10. No claims are allowed.

Conclusion

11. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to JASON M. PERILLA whose telephone number is (571)272-3055. The examiner can normally be reached on M-F 8-5 EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Chieh M. Fan can be reached on (571) 272-3042. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Jason M Perilla/
Primary Examiner, Art Unit 2611
June 3, 2009

/jmp/